

**A REVIEW OF THE EUROPEAN AND AMERICAN
URANOSCOPIDÆ OR STAR-GAZERS.**

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In the following paper, I give the synonymy of the species of *Uranoscopidæ* or Star-Gazers found in European and American waters, with an analytical key by which the genera and species may be distinguished. The specimens examined mostly belong to the Museum of the University of Indiana, nearly all of them having been collected by Dr. Jordan.

The family of *Uranoscopidæ* is here accepted as limited by Dr. Gill and by Jordan and Gilbert. It may be thus defined:

Head large, broad, partly covered with bony plates. Body elongate, conic, subcompressed, widest and usually deepest at the occiput. Body either naked or covered with very small, smooth, adherent scales, which are arranged in very oblique series running downward and backward; the scales on the belly inconspicuous or obsolete. Lateral line little developed, running high. Eyes small, on anterior and upper portion of head with vertical range. Mouth vertical, with strong and prominent mandible; teeth moderate, on jaws, vomer and palatines.

Premaxillaries freely protractile; maxillary broad, without supplemental bones, not slipping under the preorbital. Gill-openings wide, continued forwards; gill-membranes nearly separate, free from the isthmus. Pseudobranchiæ present; 6 branchiostegals; $3\frac{1}{2}$ gills, a slit behind the last; no anal papilla. Spinous dorsal very short or wanting; second dorsal long. Anal and pectorals large, the latter with broad oblique bases, the lower rays rapidly shortened, most of them branched; ventrals jugular, close together, I, 5, the spine very short, innermost ray longest; caudal not forked. Air-bladder generally absent; pyloric cæca in moderate number. Carnivorous fishes living on the bottom of the shores of most warm regions.

Analysis of European and American Genera of Uranoscopidæ.

a. Spinous dorsal obsolete; no scales; head above covered with bone, except the groove of the premaxillary spine; the bony occipital plate coalescing with the orbital rims; humeral spine well developed; no distinct protuberances on top of head; no spine in front of humeral spine; two small forward directed spines in front of eye;

three small spines on lower margin of preopercle; upper lip scarcely fringed; no retractile tentacle in mouth. **KATHETOSTOMA**, 1.

aa. Spinous dorsal of four well developed spines; scales present.

e. Head covered above with bone except a small region between and in front of the eyes, the bony occipital plate coalescing with the orbital rims.

d. Head with spines; humeral spine well developed; one strong spine on subopercle, four smaller ones on preopercle, all directed downward; one small spine directly above and in front of humeral spine; four low, stout protuberances on top of head pointing backward; naked space between eyes extending back to posterior part of orbits; upper lip and nostrils not fringed; retractile tentacle in mouth more or less developed. **URANOSCOPUS**, 2.

dl. Head without spines; humeral spine obsolete; occipital region with bluntish projections; naked space between eyes extending back to near middle of orbits; lips and nostrils fringed; no retractile tentacle in mouth. **ASTROSCOPUS**, 3.

ec. Head above not entirely covered with bone, the occipital plate ceasing much behind the orbits; from the middle line anteriorly a Y-shaped bony process extends forward, the tips of the fork between the eyes; a trapezoidal space on either side of the Y, covered by naked skin, bounded by the Y, the eyes, the suborbitals and the occipital plate. A covered furrow behind and on the inner side of each eye terminating near front of orbits, its edges fringed. Head without spines; humeral spine obsolete; lips and nostrils fringed; no retractile tentacle in mouth. **EPSILONPHORUS**, 4.

KATHETOSTOMA.

Kathetostoma Günther, Cat. Fish. Brit. Mus. II. 231, 1860 (*læve*).
Type. *Uranoscopus lævis* Bloch and Schneider.

Etyymology. *Káthetos*, vertical; *stóma*, mouth.

This genus includes two or three species, all but one belonging to the East Indian fauna.

Analysis of American species of Kathetostoma.

a. Head very large, its upper surface covered with coarsely granular striate bones; eye 3 in interorbital space; front of dorsal nearer tip of caudal than to snout, its base equal to distance from its anterior insertion to occipital bone, its longest ray (3d) 2 in its base; front of anal opposite front of dorsal, its base somewhat longer, its height equal to that of dorsal, its longest rays reaching to base of

caudal; width of caudal base 3 in base of dorsal, its longest rays $1\frac{1}{2}$ in base of anal and but little shorter than those of pectorals; ventrals narrow, long, reaching to lower insertion of pectorals; which are broad, width of base $1\frac{1}{2}$ in longest rays, which reach to the vertical front of dorsal. Color blackish above, sides chocolate, belly yellowish covered with very small brown specks; throat white; chin and naked space on top of head black; ventrals white; pectorals black; dorsal brown, with irregularly mottled base and tipped with white; anal white anteriorly with brown specks, posteriorly darker from the greater number of specks, black blotch between 9th and 10th rays; caudal white, irregularly blotched with black. Head $2\frac{3}{8}$ in length; depth 4; D. 13; A. 13; length $4\frac{1}{2}$ inches

AVERRUNCUS, 1.

1. *Kathetostoma averruncus*.

Kathetostoma averruncus Jordan and Bollman, Proc. U. S. Nat. Mus. 1889 (Pacific Coast of U. S. of Colombia).

Habitat.—Pacific Coast of Northern South America. ($8^{\circ} 57' N.$ $79^{\circ} 31' 30'' W.$)

Etymology. Latin, a protecting deity, from a word meaning to keep off, in allusion to the defensive armature of the head. The single specimen, the type of this species, was dredged by the steamer Albatross, between Panama and the Galapagos.

URANOSCOPIUS.

Uranoscopus Linnæus, Syst. Nat. I. 250, 1758 (*scaber*).

Callionymus Gronow, Syst. ed. Gray, 43, 1854 (*araneus*) (not of Linnæus).

Type. *Uranoscopus scaber* Linnæus.

Etymology. *Ourānos*, the sky; *skopós*, looking.

This genus includes some 11 species, all of them, so far as certainly known, confined to the Old World, although but one is found in Europe.

Analysis of European species of Uranoscopus.

a. Pectorals large, base two in their longest ray, which is equal in length to caudal and extends to beyond front of second dorsal; ventrals small, their length $1\frac{1}{2}$ in that of pectoral, and extending to lower insertion of that fin; spinous dorsal small, first spine four in length of base, which is four in length of second dorsal; membrane of first dorsal extending beyond and concealing the spines; second dorsal and anal equal and opposite each other, the latter reaching to base of caudal; vent midway between snout and base of caudal.

Color dark brown above, whitish below; all the darker portions of head, body and fins densely covered with minute black specks. Head 3 in length; depth about 4; D. IV-I, 13; A. 13; length 8 inches.

SCABER, 2.

2. *Uranoscopus scaber*. Star-gazer; Bocca in capo.

Uranoscopus scaber Linnæus, Syst. Nat. I. 250, 1758 (Mediterranean); Cuv. and Val. III. 287, 1829.

Uranoscopus mus Lacèpede, Hist. Nat. Poiss. II. 349, 1799 (Mediterranean).

Callionymus araneus Gronow, Syst. ed. Gray, 44, 1854 (Mediterranean).

Uranoscopus occidentalis Agassiz, Pisc. Brazil, 123, 1829 (Atlantic Ocean); Günther, Cat. Fish. Brit. Mus. II. 229, 1860 (West Indies).

Habitat.—Mediterranean Sea and neighboring waters.

Etymology. Lat. *scaber*, rough.

This species is generally found in shallow waters in the Mediterranean. The specimens examined by me were taken by Dr. Jordan at Venice.

The brief description given of *Uranoscopus occidentalis* by Dr. Günther agrees fully with *Uranoscopus scaber*. Agassiz's specimens were from "the Atlantic," no locality being given. As most of the collections of Spix and Martius were made in Brazil, it has been assumed that this species came from Brazil also. But the habitat needs confirmation.

ASTROSCOPUS.

Astroscopus (Brevoort MS.) Gill, Proc. Acad. Nat. Sci. Phila. 20, 1860 (*anoplus*).

Agus Günther, Cat. Fish. Brit. Mus. II. 229, 1860 (*anoplus*).

Type. *Uranoscopus anoplus* Cuv. and Val.

Etymology. *Astron*, star; *skopêō*, to look.

This genus is close to *Uranoscopus*, differing mainly in the lack of armature to the head. But one species is known.

Analysis of species of Astroscopus.

a. Pectorals rather large, their longest ray equal in length to base of second dorsal and extending to front of that fin; ventrals equal in length to pectorals, and extending to front of that fin; the second dorsal equal to anal but its anterior insertion slightly posterior to that; anal rays reach to base of caudal; vent much nearer base of caudal than to tip of snout. Color dark brown above, yellowish below; lighter portions of body covered with small

white specks; chin jet black; all the fins whitish. Head $2\frac{1}{2}$ in body; depth $3\frac{1}{2}$; D. IV-I, 13; A. 13; length 2 inches. ANOPIOS, 3.

3. *Astroscopus anoplos*.

Uranoscopus anoplos Cuv. and Val., Hist. Nat. Poiss. VIII. 493, 1831 (Atlantic coast N. A., probably from Charleston); Storer, Syn. Fish. North America, 298, 1846 (copied).

Agnus anoplus Günther, Cat. Fish. Brit. Mus. II. 229, 1860 (copied).

Astroscopus anoplus Gill, Proc. Acad. Nat. Sci. Phila. 20, 1860 (no description); Gill, Cat. Fish. Eastern coast North America, 20, 1873 (name only); Jordan, Cat. Fish. North America, 118, 1885; Jordan, Proc. U. S. Nat. Mus. 608, 1886; Jordan, Manual Vertebrates of U. S., ed. V. 156, 1888.

Habitat.—South Atlantic coast of the United States from Long Island to Key West.

Etymology. *Anoplos*, unarmed.

This species seems to be rather rare on our coast, but few specimens having been taken, and these of small size, 2 to 5 inches long. The specimen examined by me is $1\frac{1}{2}$ inches long. It was taken by Dr. Jordan at Key West.

UPSILONPHORUS.

Upsilonphorus Gill, Proc. Acad. Nat. Sci. Phila. 113, 1861 (*Y-graecum*).

Type. *Uranoscopus Y-graecum* Cuv. and Val.

Etymology. *y*, *psilon*; *phorós*, Y-bearing.

This genus is well distinguished from *Astroscopus* by the peculiar armature of the top of the head. Two species are known, both of the New World.

Naked space between forks of the Y on top of head long and narrow, shorter than the vertical limb of the Y; no distinct spines before eye; white spots on body distinct, each surrounded by a dark ring; eye $3-3\frac{1}{2}$ in interorbital space; base of the two dorsals greater in length than distance from front of first dorsal to tip of snout; base of first dorsal twice length of its first spine; first spine equals in length the third, and half that of the second, and slightly exceeds the fourth; base of second dorsal equals twice length of its longest ray; caudal equal in length to ventrals; pectorals longer than ventrals and extending to middle of second dorsal. Color dark brown above, white below; upper parts covered with small roundish white spots, each surrounded by a dark ring; lower jaw and labial fringes similarly spotted; spinous dorsal black, white posteriorly;

anterior portion of second dorsal brown; central portion with a horizontal white and black band, and tipped with white; posterior portion with two vertical black stripes and a white one between them; caudal black, tipped with white, with two longitudinal white stripes, its upper and lower edges narrowly white; anal white at base and tip, with a black median band half the depth of fin, darkest posteriorly, with last ray white; pectorals brown with a black band below, and the lower edge white; ventrals white, with a black longitudinal streak near tip and center of fin. Head $2\frac{3}{4}$ in body; depth $3\frac{1}{2}$; D. IV-I, 13; A. 13; length 12 inches.

Y-GRAECUM.

4. *Upsilonphorus Y-graecum*.

Uranoscopus Y-graecum Cuv. and Val., Hist. Nat. Poiss. III. 308, 1829 (origin unknown); Günther, Cat. Fish. Brit. Mus. II. 229, 1860 (Caribbean Sea).

Upsilonphorus Y-graecum Gill, Proc. Ac. Nat. Sci. Phila. 113, 1861 (Caribbean Sea); Jordan, Cat. Fish. North America, 118, 1885; Jordan, Proc. U. S. Nat. Mus. 28, 1886 (Beaufort, N. C.); Jordan, Manual Vertebrates U. S. Ed. V. 156, 1888.

Astrosopus Y-graecum Bean, Proc. U. S. Nat. Mus. 58, 1879 (Saint John's River, Fla., and Matanzas River Inlet, Fla.); Gill, Proc. Ac. Nat. Sci. Phila. 21, 1860 (name only); Jordan and Gilbert, Synop. Fish. North America, 628, 1883.

Habitat.—Atlantic Coast of North America in sandy bays, from Cape Hatteras to Surinam.

Etymology. Lat. *Y-graecum*, the letter Y.

Specimens are in the National Museum from Matanzas River Inlet, Fla., and Saint John's River Fla.

This species is rather common along the coasts of the South Atlantic and especially the Gulf States, in sandy bays, mostly in shallow water. The specimens examined by me are from Pensacola, and Beaufort, N. C.

Naked space between forks of Y on top of head short and broad, but longer than the vertical limb of the Y, which is very short; two distinct spinules directed forward before eye; white spots on body very small and irregular without dark rings; eye $5\frac{1}{2}$ in interorbital space; base of the dorsals equal in length to the distance from front of first dorsal to tip of snout; base of first dorsal twice length of its longest spine; first spine equal to the second in length, and three times the length of the last; length of middle caudal rays a little less than that of ventrals; pectorals slightly longer than ventrals,

3½ in total length and extend to 5th anal ray. Color of upper parts of body and lower jaw bright chocolate; belly and throat white; darker portions covered with numerous circular spots much lighter than ground color; membrane of first dorsal black; second dorsal white with three irregular bands of dull black obliquely across it; the caudal with three parallel bands of blackish brown, the middle of which appears to be the continuation of a variable longitudinal band on the center of each side; the anal has a variable band of dull brown, darker upon the posterior termination. Depth 4 in. length in young and 3¼ times in adult; D. IV or V—13 or 14; V. 6. GUTTATUS.

5. *Upsilonphorus guttatus*.

Astroscopus guttatus Abbott, Proc. Ac. Nat. Sci. Phila. 365, 1860 (Cape May, N. J.)

Upsilonphorus guttatus Bean, Proc. U. S. Nat. Mus. 60, 1879 (Tompkinsville, N. Y., and Norfolk, Va., and other localities).

Astroscopus anoplus Bean, Proc. U. S. Nat. Mus. 58, 1879 (Tompkinsville, N. Y., and Norfolk, Va.); Jordan, Cat. Fish. North America, 118, 1885 (Young); Bean, Bull. U. S. Fish. Com. 130, 131 and 136, 1888. (Somers Point, N. J.)

Upsilonphorus guttatus Gill, Proc. Ac. Nat. Sci. Phila. 113, 1861.

Habitat.—Atlantic Coast of United States from Long Island to Norfolk, Va.

Specimens are in the National Museum from Tompkinsville, N. Y., and Norfolk, Va.

This species reaches the same size as the preceding. The distinctive characters pointed out by Dr. Jordan in Synopsis Fishes N. A. 941, 1883, hold good for the adult as well as for the young. That the two species are distinct is evident from comparison of specimens in the National Museum, which Dr. Jordan made at my request. In the National Museum specimens of the two species equally large in size are preserved. The localities recorded for *U. guttatus* are all to the north of Cape Hatteras; those for *U. y-graecum* all to the south.

Dr. Jordan says: "In *U. guttatus* the pale spots are much smaller, less sharply defined, and occupy a smaller area than in *U. y-graecum*; the lower part of the head has two black blotches in both species; the second dorsal, anal, and ventrals are nearly or quite plain. The naked area behind each eye is [in *U. guttatus*] lunate, its length barely twice that of the snout; the bony V-shaped plate is short and broad, concave on the median line, and forked for about half its

length, the posterior undivided portion broader than long; the bony bridge across the occiput but little shorter than the part of the head which precedes it. In *U. y-graecum* the naked area is trapezoidal, longer than broad, and about 4 times the length of the snout; the Y is forked for more than half its length, its undivided part more than twice as long as broad, and not concave; the occipital plate is not half as long as the part of the head which precedes it."

According to Dr. J. A. Henshall, the naked area on top of the head is the seat of electric power in life. This interesting statement needs verification.

Recapitulation.

The following is the list of the genera and species of the family of star-gazers (*Uranoscopidae*) recognized in this paper as occurring in European and American waters:

1. **Kathetostoma** Günther.
 1. *Kathetostoma averruncus* Jordan and Bollman.
2. **Uranoscopus** Linnaeus.
 2. *Uranoscopus scaber* Linnaeus.
3. **Astroscopus** Brevoort.
 3. *Astroscopus anoplus*. (Cuv. and Val.)
4. **Upsilonphorus** Gill.
 4. *Upsilonphorus Y-graecum*. (Cuv. and Val.)
 5. *Upsilonphorus guttatus*. (Abbott.)